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Proposed Airborne InfraRed Surveillance (AIRS) Advanced Concept Technology Demonstration

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August 1, 2001, Breakfast Club Briefing



**U.S. Army Space and Missile
Defense Command**



Central MASINT Organization



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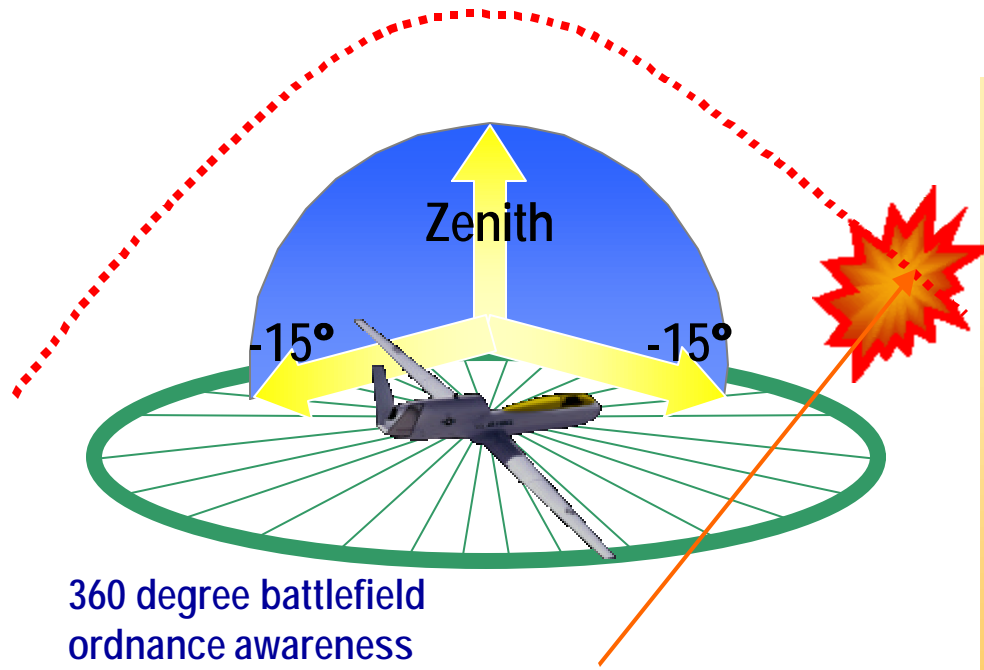


Briefing Outline

- **Problem To Be Solved**
- **Military Utility**
- **Technical Description**
 - **Emerging Solution**
 - **Measures of Effectiveness**
- **Management**
- **Scheduling**
- **Funding**
- **Summary**



ACTD Purpose



Demonstrate highly capable surveillance platform which provides full protection in missile defense and intelligence collection roles.

Direct Utility in TMD Surveillance and Gap-Filler for NMD Surveillance



ACTD Motivation

1. Military Missions

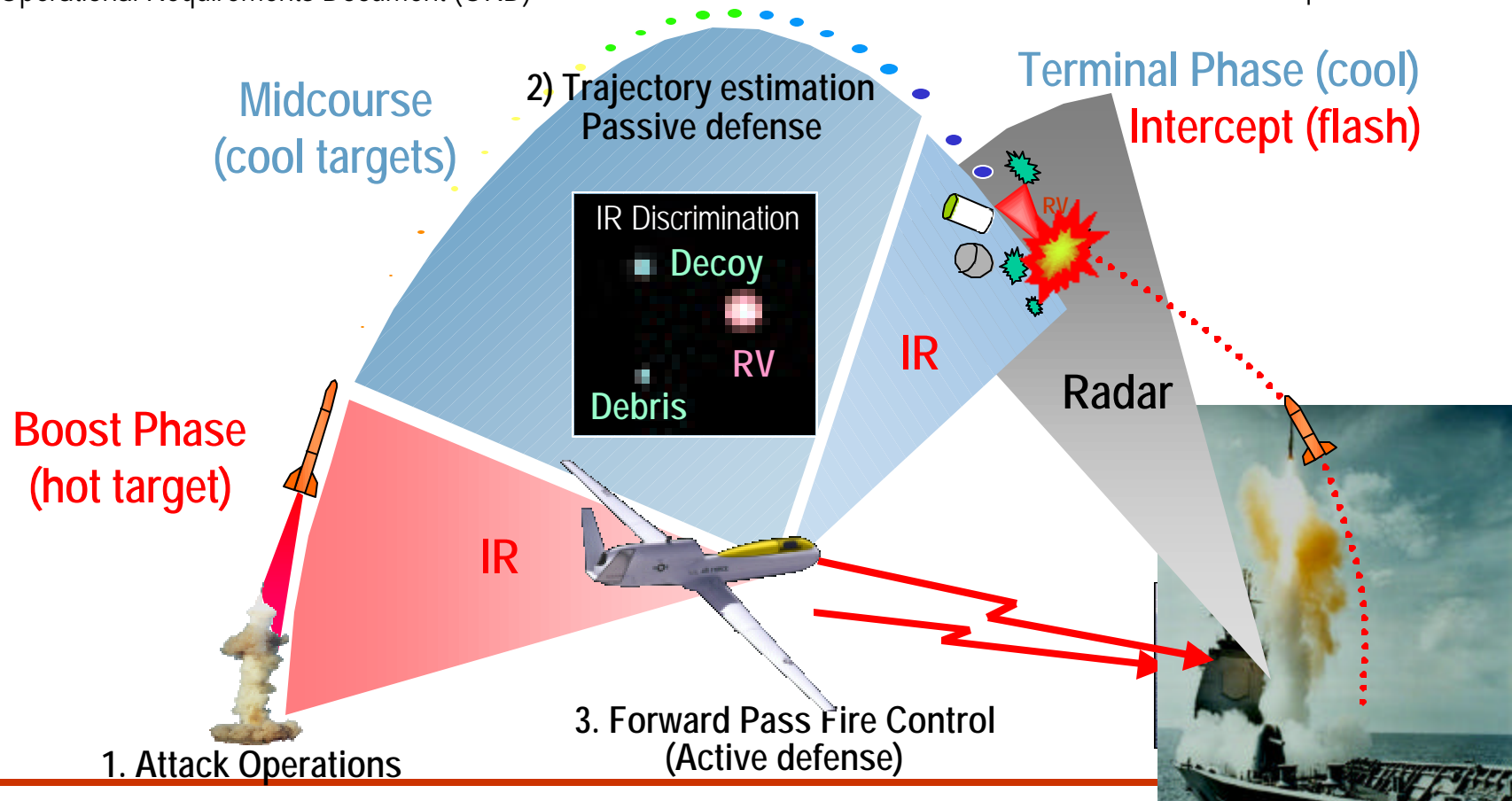
Support active and passive missile defense and attack operations

Basis for Requirement: Family of Systems (FoS)
Operational Requirements Document (ORD)

2. Technical Intelligence

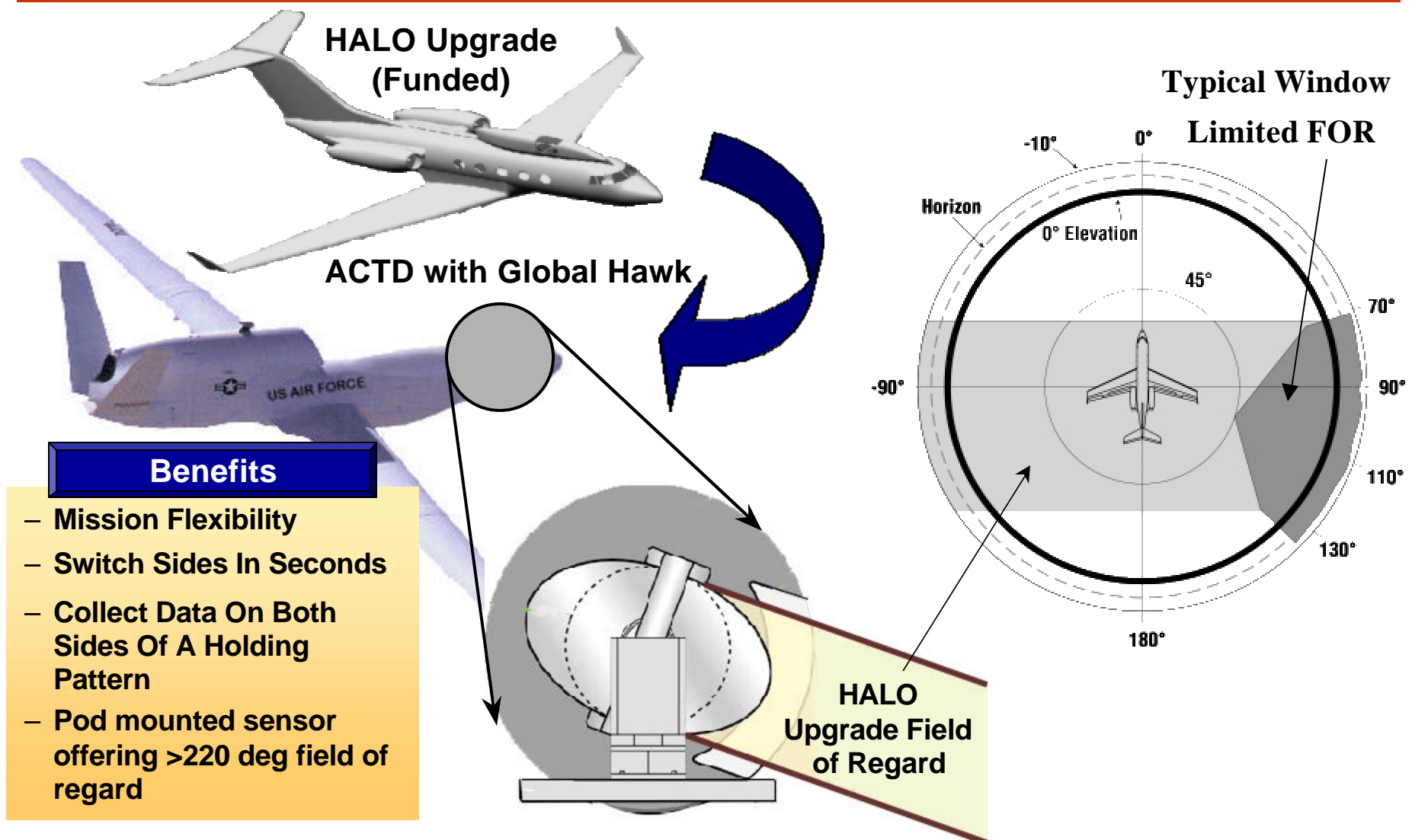
Provide threat engineering info in support of missile defense development

Basis for Requirement:
CMO/BMDO Data Production Requirement





Emerging Solution



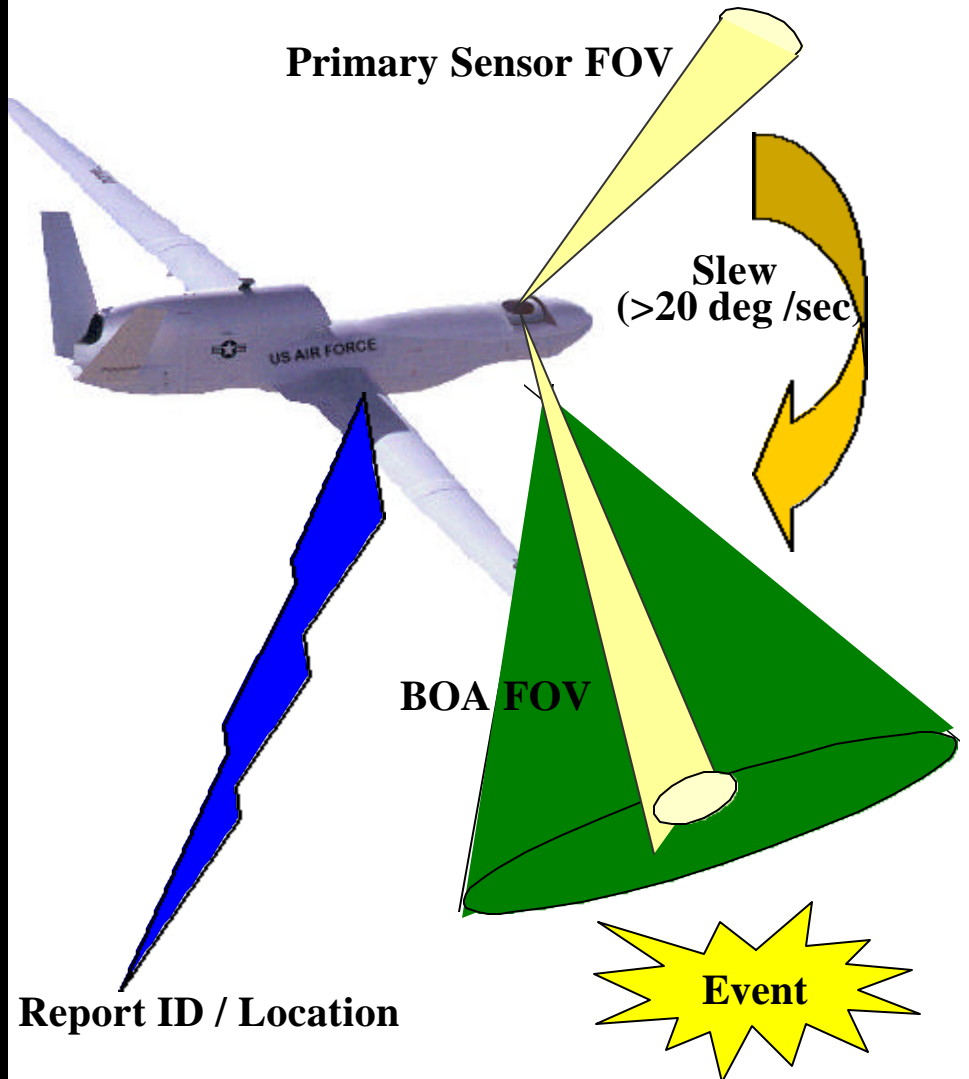
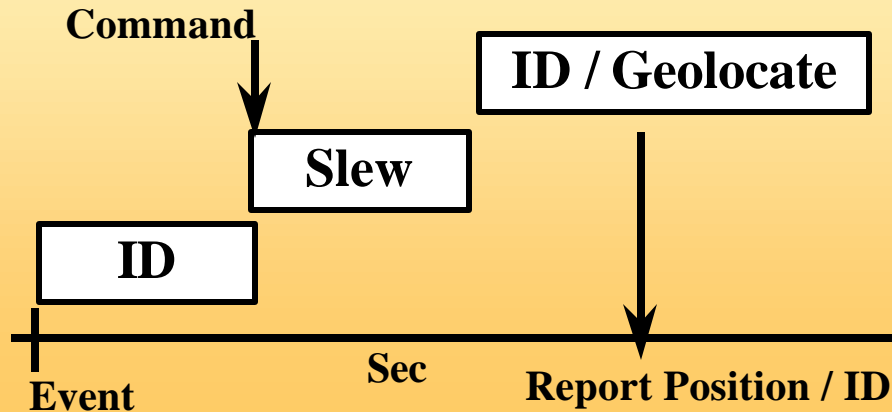


AIRS BOA ConOps

Concept

- BOA Provides Wide Angle Surveillance / Self-cueing for AIRS
- BOA ID's Event type / Rough Heading
- Slew Primary to ID / Geolocate
- Send Message to Theater/ use onboard

Timeline





Warfighter: Middle East Coverage

Based from Diego Garcia

UAV Specifics:

- 36 hour airtime
- 1 hour climb to altitude
- 1 hour decent
- 150 - 200 km racetrack
- Velocity = 0.7 mach
- 4 hours reserve

Sensor Specifics:

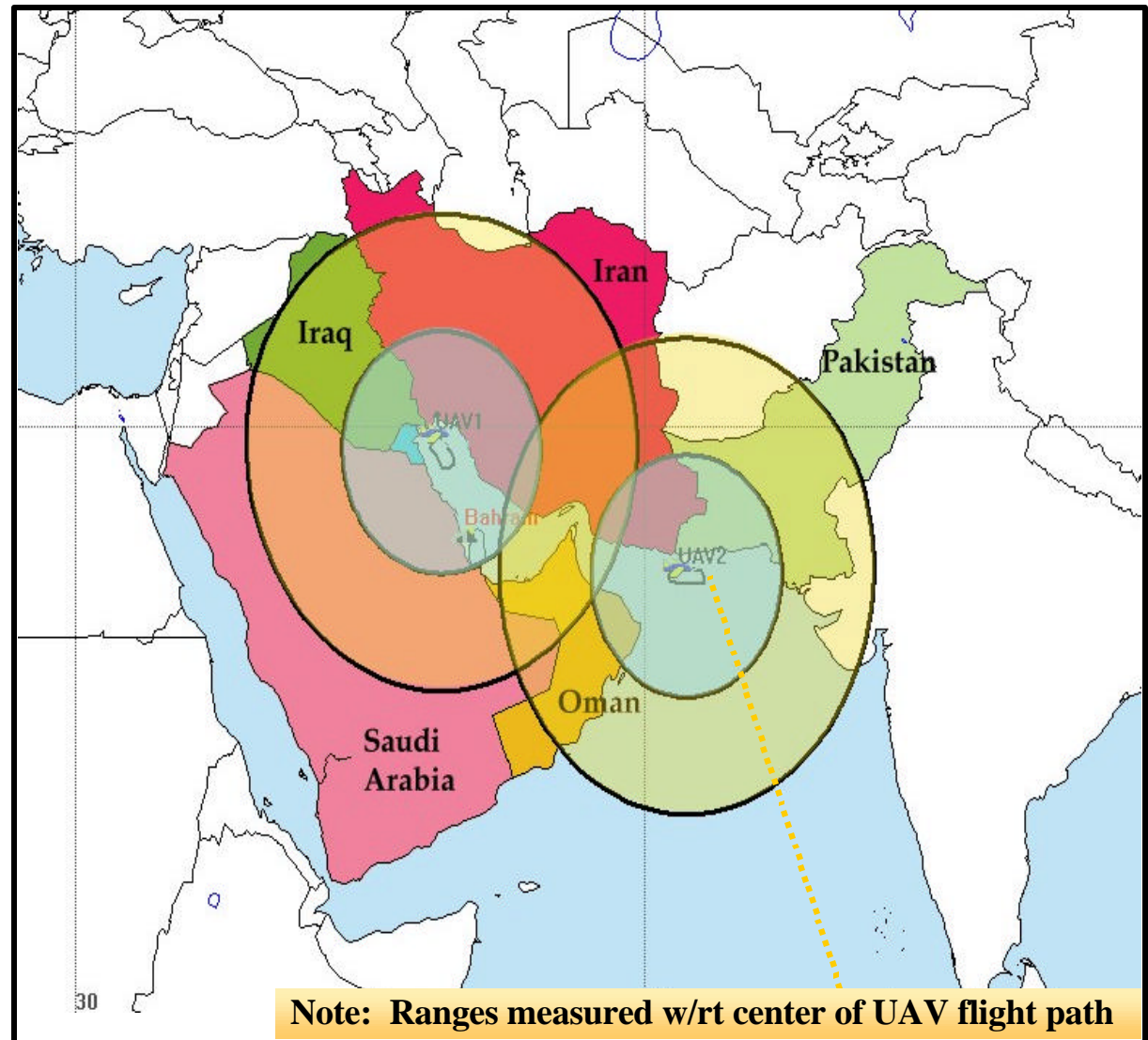
- Sensitivity = 1×10^{-16}
- SNR = >10

Target Specifics:

- Intensity: >100 watt/sr

Results:

- 18 hours on-station time for Iran
- 21 hours on-station time for Pakistan





Warfighter: East Asia Coverage

Based from Kadena

UAV Specifics:

- 36 hour airtime
- 1 hour climb to altitude
- 1 hour decent
- 150 - 200 km racetrack
- Velocity = 0.7 mach
- 4 hours reserve

Sensor Specifics:

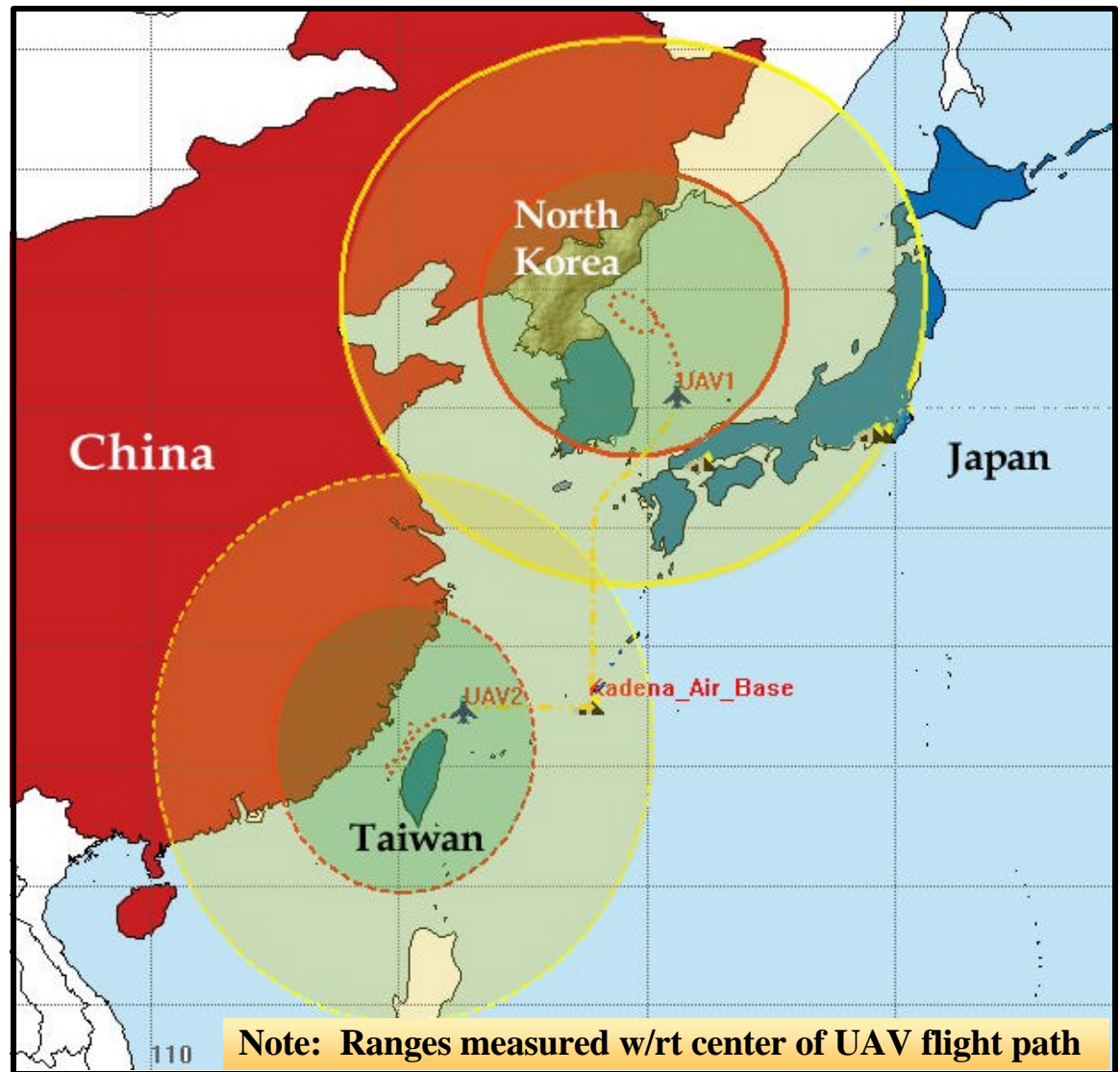
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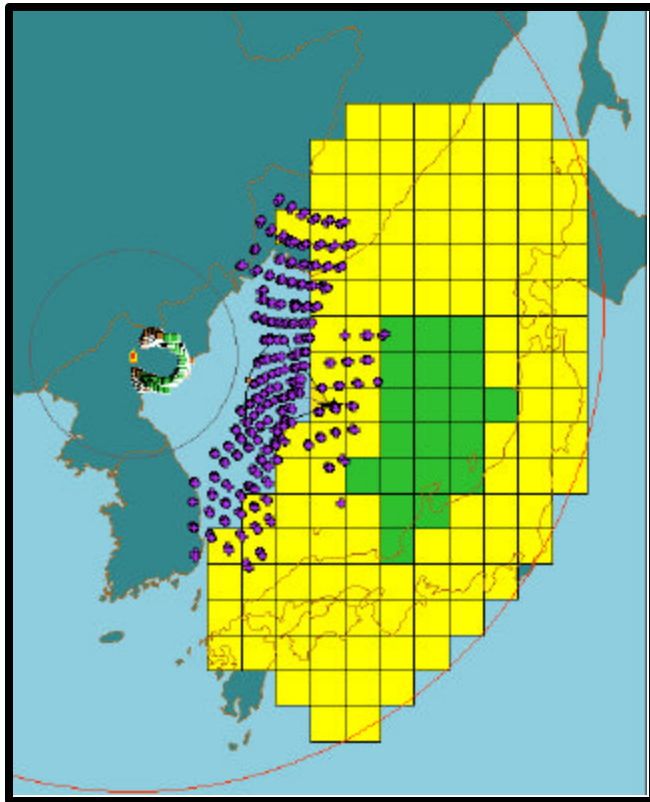
- 26 hours on-station time for North Korea
- 28 hours on-station time for Taiwan



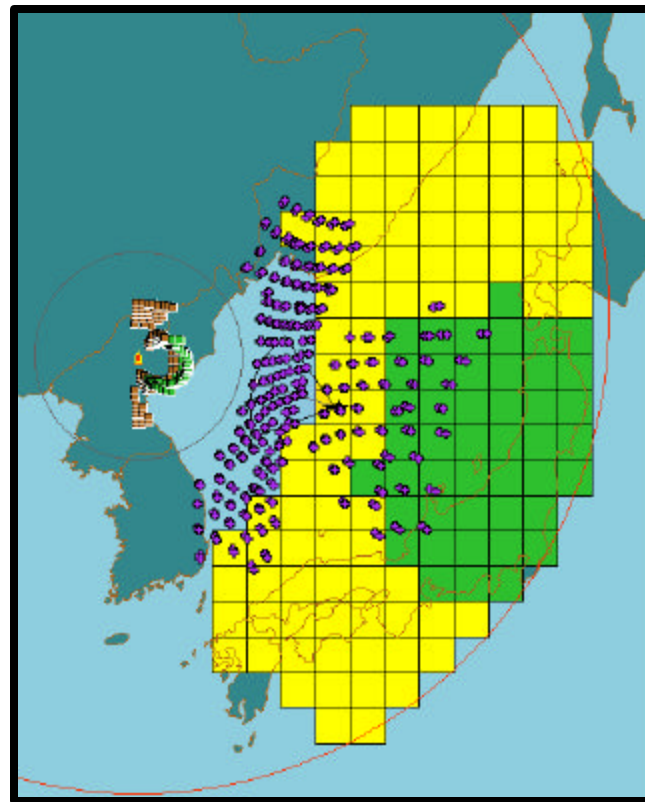


CAPS Model Defended Area Analysis (Commanders Analysis and Planning Simulation)

SBIRS Cue



AIRS Commit - 50 sec after BBO



- Navy Upper Tier
- SRBM Threat
- SBIRS High Cue 5 sec after BBO

Depth of Fire

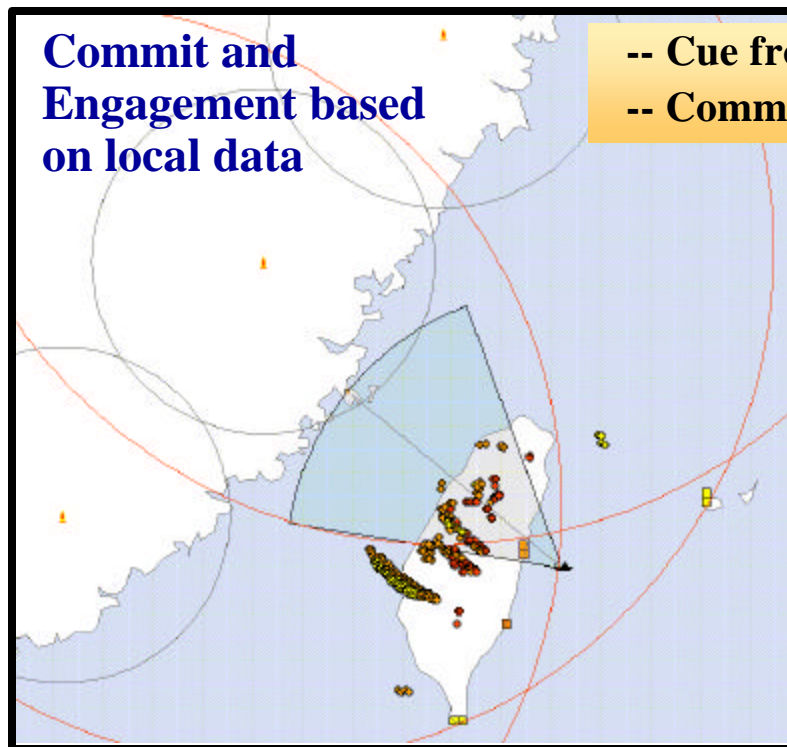
- Single Shot
- 2 Shot (SLS)

- + Intercept Point
- Detection Point - Intercept Possible
- Detection Point - No Intercept Possible



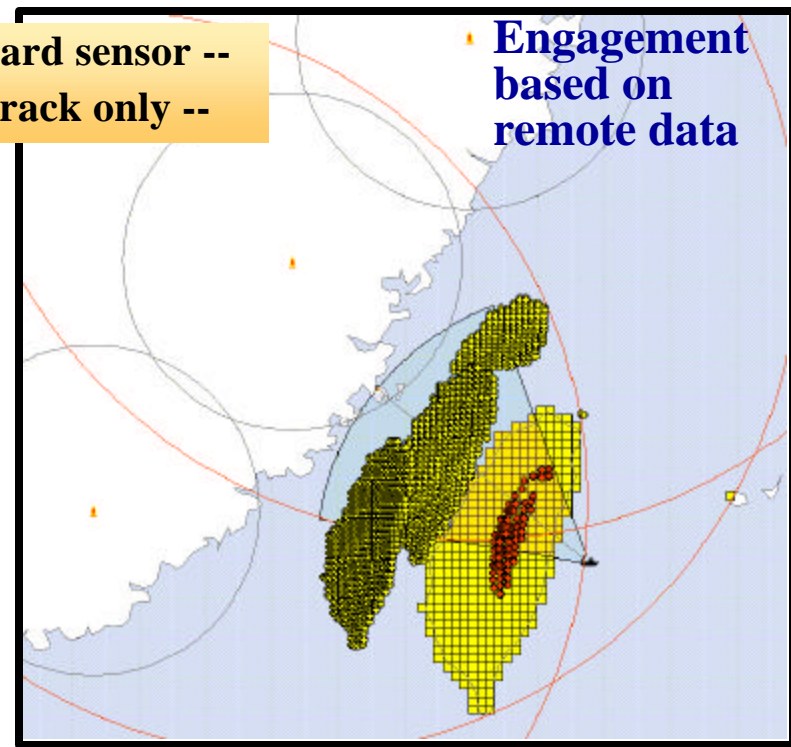
CAPS Model Taiwan Area Analysis

**Cued with Autonomous
Engagement Support**



-- Cue from off-board sensor --
-- Commit to RV track only --

**Commit and Engage
on AIRS Sensor**

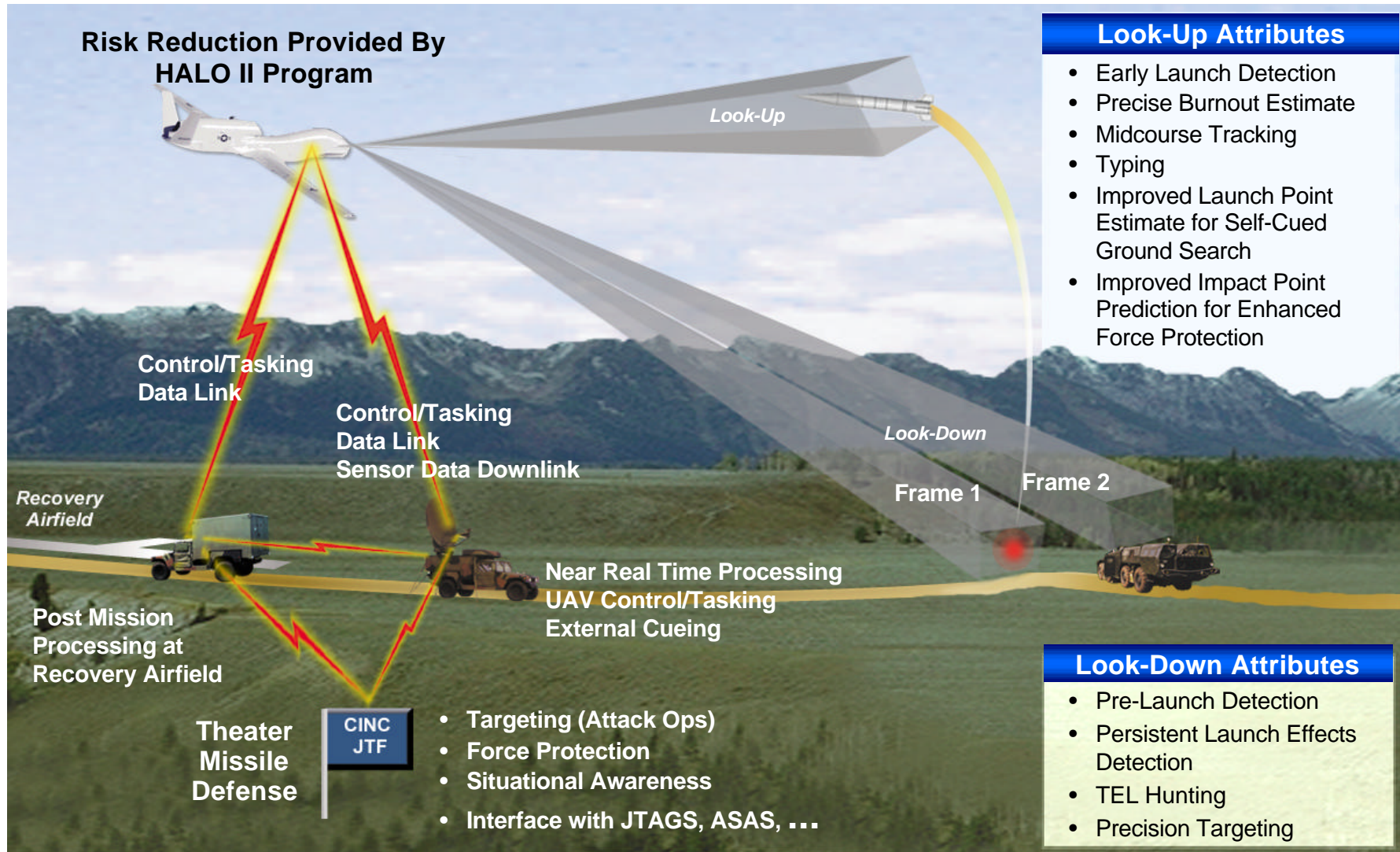


Intercept Crosses colored according to intercept altitude

Grid squares colored according to the color of the highest first intercept against all threats in-bound to that grid

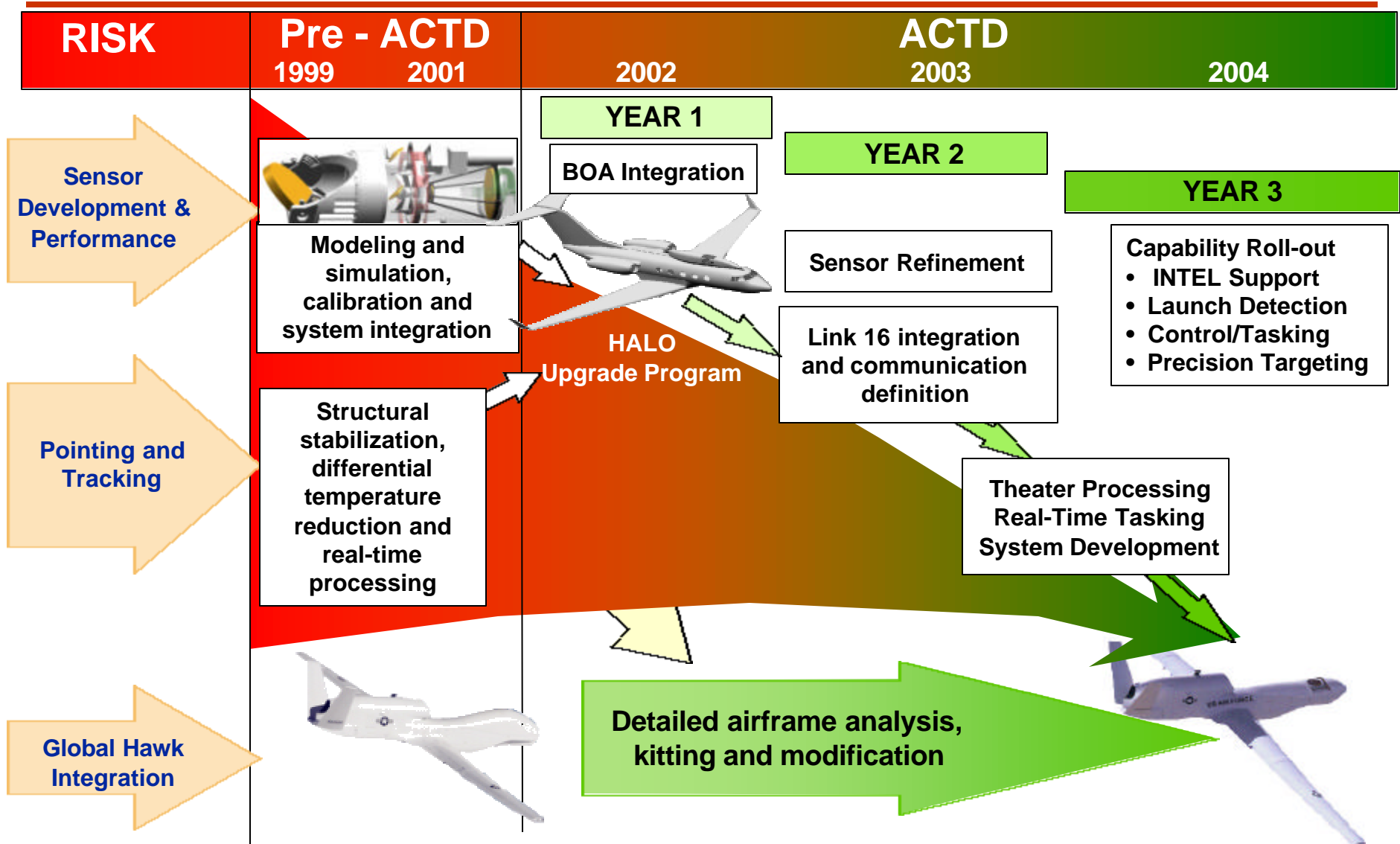


INTEL Connectivity





ACTD and Risk Reduction Efforts





HALO- II Features

HALO-II designed to meet current and future BMDO data collection requirements*



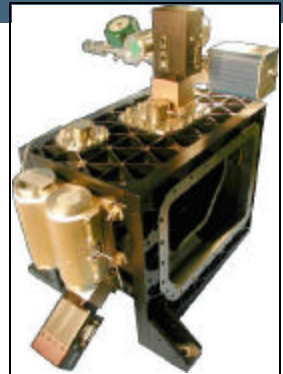
* BMDO requirements for high-resolution aim-point selection data requires fly-along sensor package (FASP)

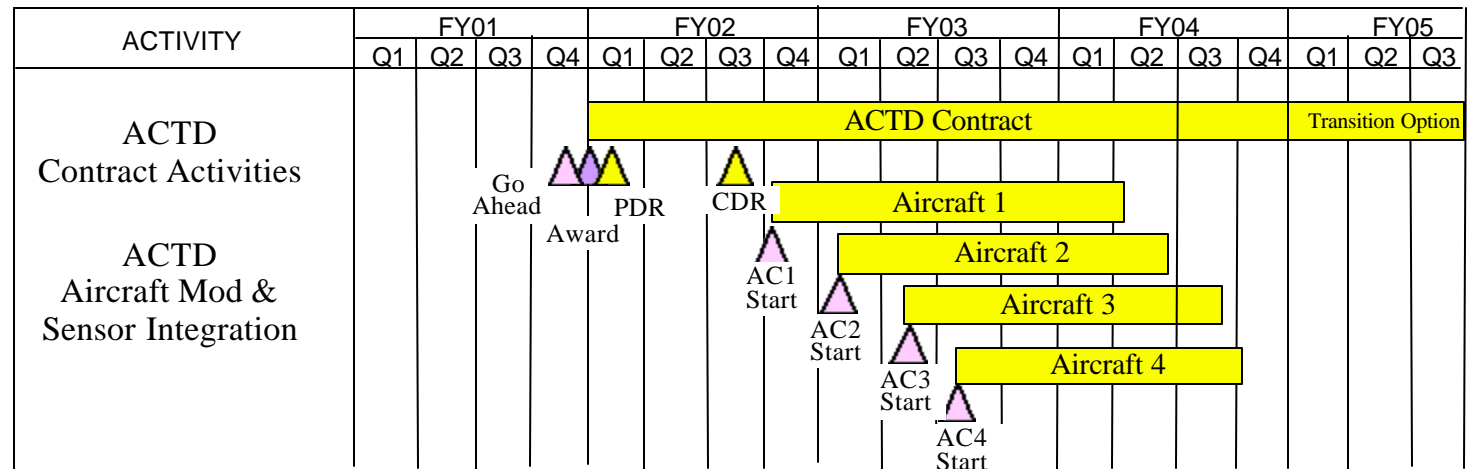
Features

- Low development cost
- Low annual O&M cost
- System Exceeds MWIR & LWIR Sensitivity Requirements
- Large field of regard
- Multiple sensor
- Filter selectivity
- Real-time radiometry
- Real-time track generation
- Processors sized for algorithm development
- NMD risk reduction
- Higher altitude performance
- Minimal ground support
- Accommodates guest sensors



Prototype Aircraft







Management: Proposed Organizational Relationships

Development Managers

- BMDO / SMDC

Operational Managers

- CENTCOM / JFCOM or
- PACOM

INTEL Tasking & Data Exploitation

- DIA / CMO

Potential Warfighter Users

- CENTCOM/JFCOM - Active TMD, WMD Targeting
- PACOM-NAVY TBMD Fire-control



Programmatics: Cost

Cost Element	NRE	Benefactors
– GH Airframe & Sensor Integration	\$30M	Aeromet Team
– Production Sensors (4)	$\$11\text{M} \times 4 = \44M	
– GH Ground Segment	\$30M	Northrup
– Production Aircraft (4)	$\$22\text{M} \times 4 = \88M	Grumman
– Program Office / Government Oversight	\$22M	BMDO / SMDC
– BOA	\$10M	BOA Team

<u>TY \$M</u>	<u>FY00</u>	<u>FY01</u>	<u>FY02</u>	<u>FY03</u>	<u>FY04</u>	<u>FY05</u>	<u>FY06</u>	<u>FY07</u>	<u>Total</u>
NRE	0	20*	30	100	94	0	0	0	224
Yearly	0	0	0	0	15	15	15	15	60

* HALO II funding,
provides risk reduction



Programmatics: Potential Funding Breakout

Notional only, no agreements in place

Organization	Cost Share
– BMDO	\$30M*
– ACTD (OSD AS&C)	\$44M
– GDIP	\$110M
– Navy	\$20M
– Army	\$20M

Total: \$224M

*** Potential FY02 Congressional Add, per HASC markup**



Summary

AIRS ACTD will provide critically needed capabilities:

- Warfighter capabilities for NTMD and related missions
- INTEL capabilities for BMD development
- Missions for attack operations, and space surveillance
- AIRS ACTD has modest cost ~\$224 M over 3 years

Recommendation

Approve AIRS Program



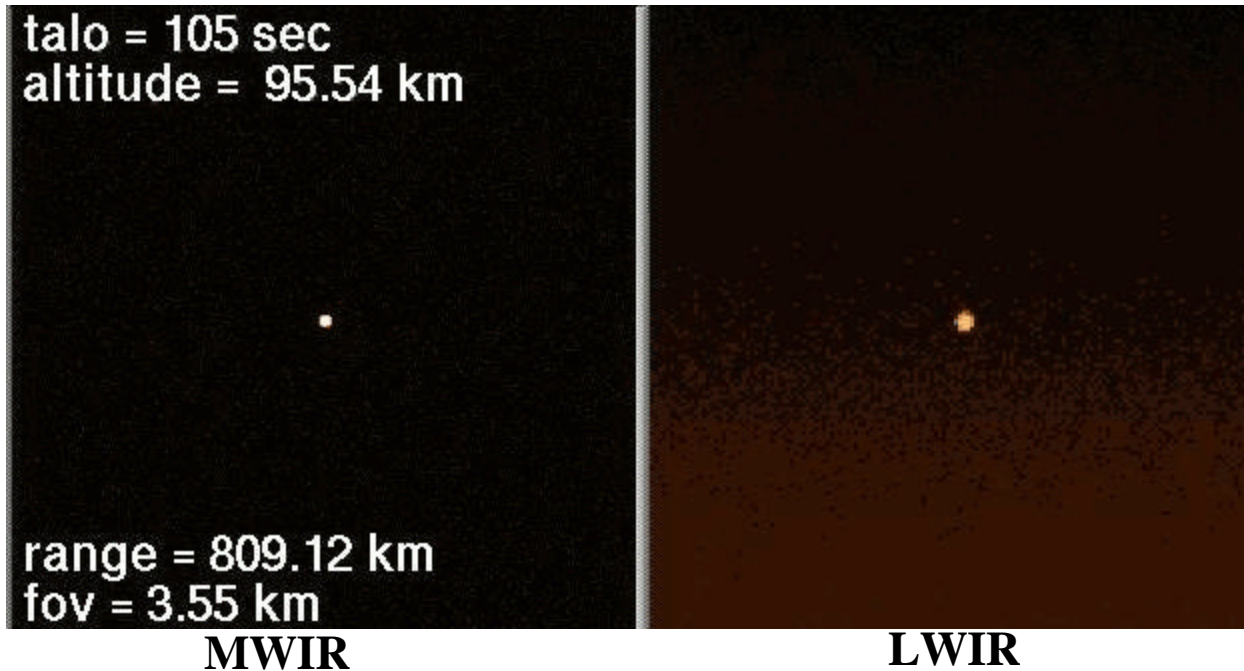
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BACKUP SLIDES

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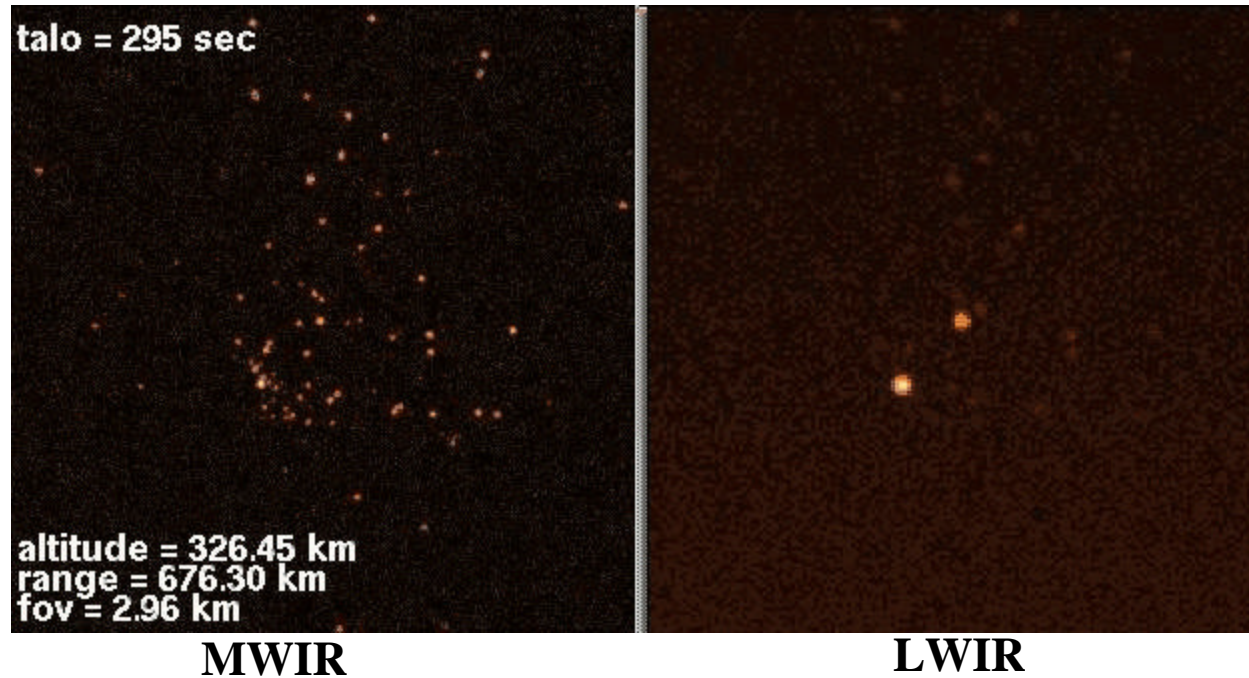
Simulated AIRS View of Foreign Test - 1



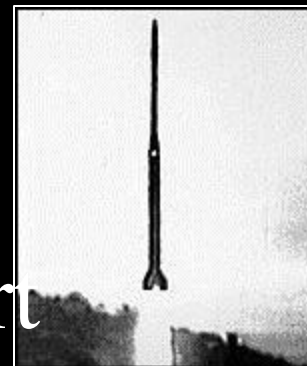
- Hypothetical 2 stage solid MRBM
- Test on Iranian inland range
- AIRS on station in Persian Gulf
- Highest fidelity simulation
- Synthetic Scene Generation Model
 - Correct signatures
 - Correct sensor parameters



Simulated AIRS View of Foreign Test - 2



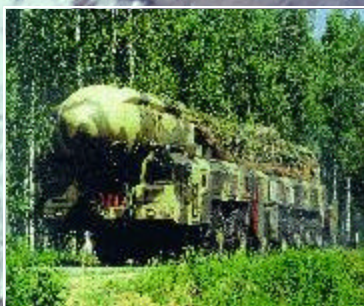
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- Synthetic Scene Generation Model
 - Correct signatures
 - Correct sensor parameters



Rumsfeld Commission Report

July 15, 1998

“The threat...is broader, more mature and evolving more rapidly than has been reported in estimates and reports by the Intelligence Community.”





Rumsfeld Commission Report

July 15, 1998

“The Intelligence Community’s ability to provide timely and accurate estimates of ballistic missile threats to the U.S. is eroding.”





Customers and Products

Customers

Warfighter

Acquisition

Policy/Intelligence

Products

Attack Operations

- Launch Point Detection (with BOA*)
- Attack Package Vectoring (with BOA*)
- Real-Time IPB Update (with BOA*)

Passive Defense

- Early Warning/Tracking
- Impact Point Prediction

Active Defense

- Fire Control Support and Cueing

Other

- Situational Awareness

- Domestic T&E Support
- Foreign Systems Signatures and Metrics

- Treaty Monitoring
- Foreign Test Surveillance
- Foreign Test Design/Signatures

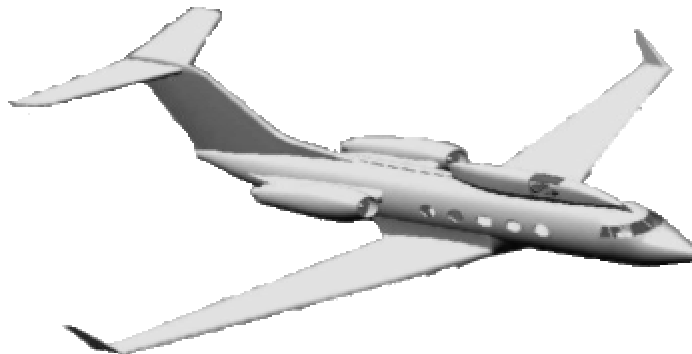
*BOA Battlefield Ordnance Awareness



UAV Fleet

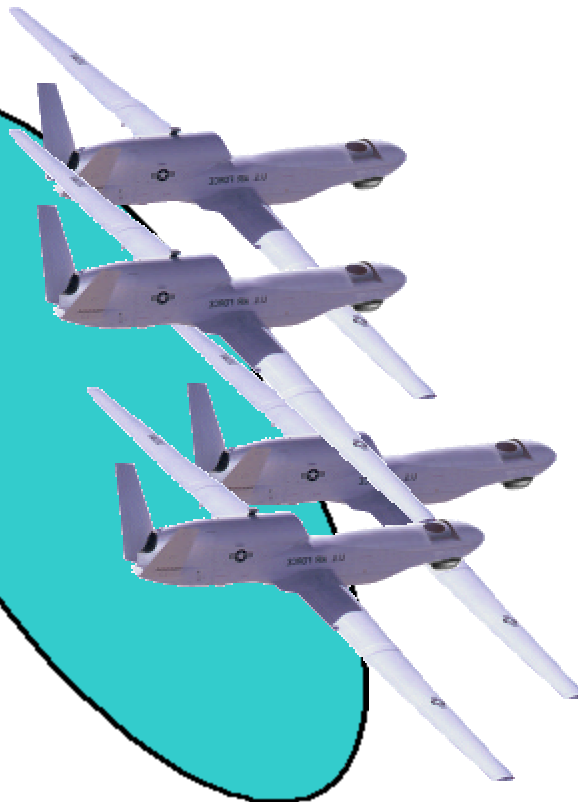
Concept

- Multiple UAVs
- 4 Platforms for BMD Intel support



Cost

\$220M Total NRE (4 Platforms)
\$30M Ground segment
\$35M Airframe & Sensor Integration
\$22M Government Oversight
\$5M BOA Sensors
\$22M Per Airframe
\$10M Per Sensor

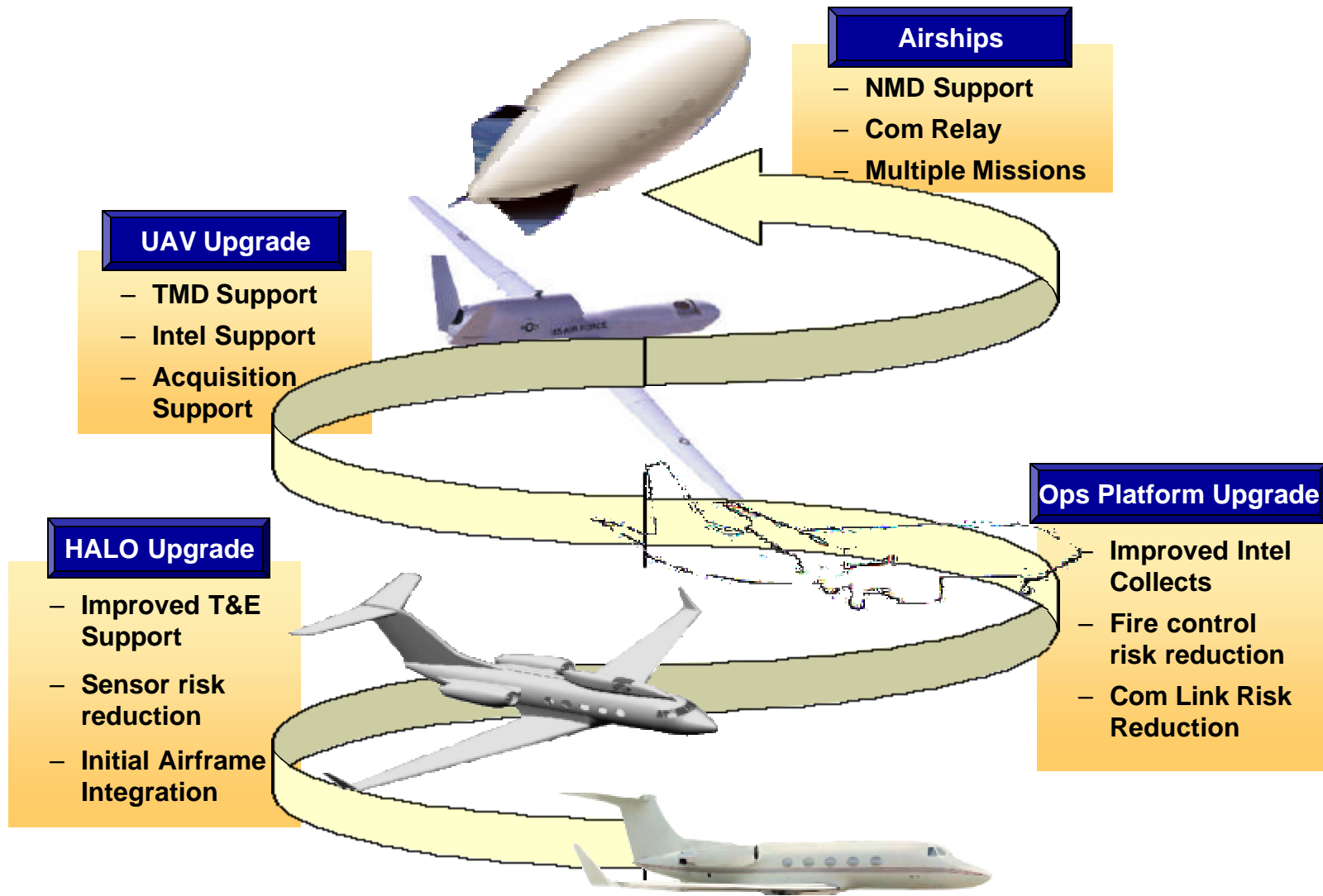


Schedule

3-4 years to full operation



Spiral Development Plan





BOA Implementation

Concept

Interface Definition

- BOA to AIRS Processor

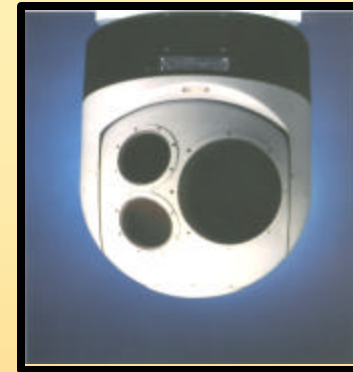
Sensor Optimization trade

- Turret vs. staring radiometer

Process Hosting

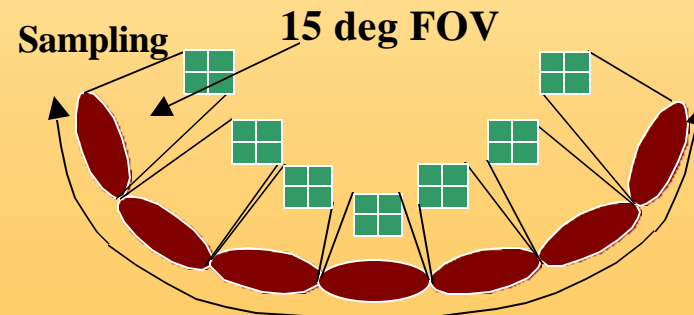
- Event Typing
- ID / Cueing
- Report to Theater

Options



Turret wide angle system

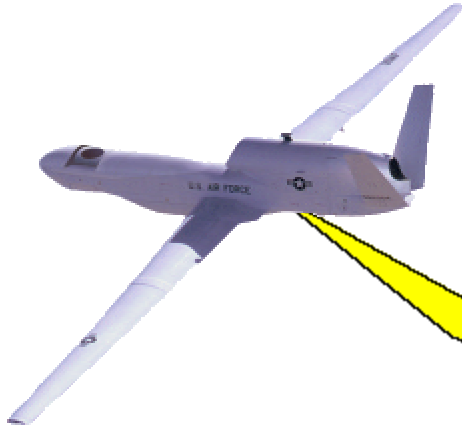
50-100kHz



Staring multi-channel radiometer



Navy Roles - Motivation



Primary

- IR Intel Collection
- Midcourse long range TBM precision track adjunct
- Single Beam Queing
- High Altitude cruise missile defense

Secondary

- CEC alignment platform
- CEC Relay Platform
- Target Identification (weather dependent)
- Low altitude cruise missile defense (weather dependent)
- Surface / Air Intel (weather dependent)





Current TPED Activities

Airplane

- Tasking and response strategy
- Onboard processing
- Requirements on radios and links
- Message format requirement
- Mass storage transport requirement

Ground Segment

- Required connectivity to theater intelligence links
- Ground processing of non real-time imagery
- Operator interface
- Tasking and mission control

Study work will result in TPED specification and statement of work



ACTD Potential

Sensor on UAV Capable of Multipurpose Use

Passive Defense

- Warning
- Missile Typing
- Impact Point Prediction

Active Defense/Engagement Support

- Midcourse Tracking / Discrimination
- Fire Control Support for Missile Engagement
- Target Object Mapping
- Kill Assessment

Attack Operations

- Launch Point Identification
- TEL Tracking
- Targeting Quality Geolocation
- Battle Damage Assessment

Space Surveillance and Space Control

Situational Awareness/Informational Dominance

- Battlefield Ordnance Awareness
 - » Detect, Locate, Identify
- Update Intelligence Preparation of the Battlefield (IPB)

Counter Drug/Low Intensity Conflict